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Improving Operational Readiness of Airport Emergency Response Crews: Utilization of Gaming Theory in Decision Making Simulations

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IMPROVING OPERATIONAL READINESS OF AIRPORT EMERGENCY RESPONSE CREWS: UTILIZATION OF GAMING THEORY IN DECISION MAKING SIMULATIONS

by

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This thesis was prepared under the direction of the candidate's thesis committee chairman, Dr. Henry Lehrer, Department of Aeronautical Science, and has been approved by the members of his thesis committee. It was submitted to the Office of Graduate Programs and was accepted in partial fulfillment of the requirements for the degree of Master of Aeronautical Science.

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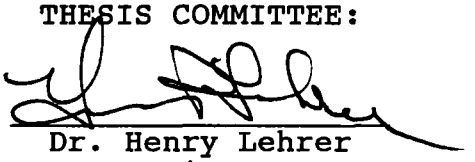

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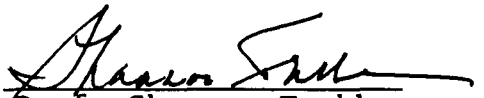

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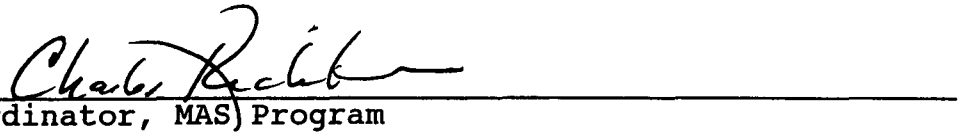

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ABSTRACT

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The purpose of this study was to evaluate the potential effects of simulation gaming technique on the decision-making skills of airport emergency response technicians. Through the use of descriptive research methods this study has examined the benefits of using simulation training to enhance operational readiness. A specialized questionnaire was developed using a Likert scale format to attain the opinion of 20 airport directors--or their representatives. Findings did support the research hypothesis that the introduction of simulation training (Table Top) exercises would increase the operational readiness of airport emergency response crews. Statistical analysis of survey responses found that no significant difference occurred between answers provided by large airport staff and those provided by small airports.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter 1

Introduction

For many years the Department of Defense has used a form of management simulation training to develop the decision-making talents of its officers. In recent years, this gaming practice has even been incorporated into computer wargaming exercises which help prepare the Armed Forces for conflicts such as the Gulf War. Centers for management development like the Army War College still use table top simulations to develop tactical decision-making skills.

In the world of airport management, a dramatic need for training and practice exists in the realm of emergency response management. "The main problem most rescue organizers face is the coordination of all the various diverse services, many from local authorities and based off the airport" (Butterworth-Hayes, 1991, pp. 34). Research into the possibility of using table top simulation exercises to develop decision-making skills in leaders and line personnel of emergency response crews should be explored. The assets of a community available to counteract catastrophic aircraft mishap must be coordinated and trained in a viable and efficient manner. According to Sims (1993) the importance of understanding the individuals needs is paramount when conducting training for the public sector employee.

The Library of Congress defines the term of Operational Readiness as "the capability and readiness of military equipment and personnel to perform the mission or functions for which they were organized or designed" (Subject 1994, p. 3448). This study helps determine if table top simulation training can enhance operational readiness of emergency response crews for both on and off airport agencies. The importance of a ready force is obvious when viewed in the light of past experience. Often the unexpected can complicate emergency response as was seen in the 1990 collision of two Northwest Airline Flights at Detroit Metropolitan/Wayne County Airport (DTW). Emergency response at DTW "was somewhat delayed because of low visibility in the fog, possibly as low as 50 to 100 feet... The fire trucks were also delayed because they had to maneuver around various aircraft on the taxiways" (NTSB, AAR-91/05, 1991, pp. 35).

Because of the complexity of emergency response specific terminology, the following series of abbreviations and terms is provided for the reader. In many cases a term which was specifically designed for the example rule book found in appendix E is also described below:

1. The completion by a participant of an assigned event selected from the table of events issued by the Evaluation Team is known as an "Action".

2. Aqueous Film Forming Foam "(AFFF) is an extremely effective extinguishing agent for hydrocarbon fuels" (Carlson, 1992, p. 60).

3. The term Comm Center is used within the example rule book to describe any dispatch, or emergency airport communication center that would operate on a normal bases.

4. A single situation describing a specific assignment or duty that any one or group of emergency response personnel would be called upon to accomplish during simulation training is know as an "Event".

5. The Federal Aviation Administration (FAA) "may be designated by the NTSB to investigate aircraft accidents within the United States involving fixed-wing aircraft with a take off weight up to a maximum of 12,500 pounds" (Carlson, 1992, p 180).

6. The National Transportation Safety Board (NTSB) was "established to determine and report the cause of transportation accidents and conduct special studies related to safety and accident prevention" (Wells, 1991, p. 9).

7. The Public Information Officer (PIO) provides accurate information to media representatives during times of emergency on the airport. "The PIO should not editorialize or speculate about the incident but should give the media only information that has been confirmed" (Carlson, 1992, p. 172).

8. Rescue and Fire Fighter (RFF) personnel "who may respond to aircraft accidents/incidents must have a minimum level of knowledge and skills to deal effectively with the variety of circumstances that could be encountered" (Carlson, 1992, p. 5).

9. Self-Contained Breathing Apparatus (SCBA) helps fire fighters in heavy smoke. "The toxic products of combustion produced can include carbon monoxide, hydrogen sulfide, hydrogen cyanide, hydrogen chloride, and phosgene" (Carlson, 1992, p. 31).

10. The Table of Events (TOE) is provided within a simulation training plan and includes all practice scenarios, and responses to these scenarios.

Statement of the Problem

This study has been conducted for the purpose of exploring the probable effect of gaming simulation exercises (Table Top) on the operational readiness of airport emergency response crews. Emergency response crews include any public or private agency--ambulance, fire, police, or Red Cross--providing emergency relief to a catastrophic aviation accident or other disaster on or around the airport. The objective was to enhance operational readiness with simulation training.

Review of Related Literature

A Review of the current literature shows very little work done on gaming theory specifically related to emergency response. However, several very good studies have applied the training method to both business and military decision-making. Gaming in business management, and military management in war gaming are two of the topics that were explored in the review. Empirical data pertaining to simulation training was examined within the related literature as was the different ways in which people learn. United States Federal Regulations provide an important component to effective response training and this was closely reviewed. Several valid sources pertaining directly to the preparation of emergency response training were also examined.

Gaming in Business Management

A deliberate study was made by Carson and Misshauk (1972) in which they describe the benefits of gaming techniques in training business students in decision-making. A variety of gaming designs are presented and discussed according to each one's advantage or disadvantage. Feedback is provided through the use of gaming theory and allows the participants to discover the success or failure of their decisions.

According to Meier, Newell and Pazer (1969) simulation techniques applied to business problems can be a powerful tool in developing managerial expertise. The discussion includes the use of both manual and computer-assisted simulation exercises. In addition, an extensive explanation of mathematical and statistical aspects in simulation training is provided for the reader. General application of management training in any field will provide valuable insight to emergency response.

Information specifically on the decision-making process and how people select options is provided by Moorhead and Griffin (1989). This book outlines the Delphi technique for decision-making and many other important aspects, including the use of decision-making trees. Discussions of individual and group decisions are also examined, as is the creativity involved in the decision-making process.

Military Management in War Gaming

Because extensive research has already been done by the military concerning wargaming technique, a natural extension would be to apply this research to airport emergency response training. Theories by Gush and Finch (1980) provide insight into the design and implementation of wargames. This derivation provides a historical account of wargaming and with it a valuable insight into the work of many other game designers. A discussion on gaming pieces, rules, board gaming, and terrain is also within this source.

Lind (1979) provides an extensive application of simulation exercises within the United States Air Force. A rudimentary concept to all gaming and simulation technique is the use of timing delays. This report emphasizes the importance of time delay during actual game play. The use, procedures, and effective prior-planning for time delays are also discussed as related to providing realism in simulation.

A modern discussion of wargaming is brought to light by Perla (1990). Through the use of a historical review, the author describes the essence of practical wargaming techniques used in the past and up to modern day. The nature, design, developing, and playing of wargames is discussed at length and many valuable studies are combined within the work. This study comes from the vantage point of naval training tactics.

When referring to operational readiness of emergency response crews it is important to define exactly what is meant by this term. Fink and Proctor (1990) discuss in length the importance of a fully operational and ready unit as one which is prepared to carry out any mission it may be assigned. This ideal is especially appropriate to emergency crews because of the parallels between catastrophic accidents and war-time environments.

Empirical Data on Simulation Training

Baker and Salas (1992) develop a vast amount of data in their comparison study of the performance measurement of teamwork skills. This study gives a series of general principles to help in determining future research into effective teamwork practices. The study also helps provide excellent data on comparisons of teams in military simulation exercises.

Grabowski and Wallace (1993) provide research into the practical usage of gaming techniques to train maritime pilots. These gaming techniques are specifically designed to prevent collision of vessels with other craft in the shipping lanes. Results showed significant improvement in personnel trained with the gaming simulations as opposed to those who were not.

Basic insight is gained in reviewing the information by Besco (1990, 1991), parts one and two. These articles dramatize the importance of being aware of the chain of events leading up to catastrophic accidents in aviation. Many separate accidents are reviewed and discussed within the article including Flight 401, an L-1011, which crashed in the Everglades outside of Miami International Airport in 1972.

How People Learn

Sims (1993) has recently recommended several important aspects to enhancement of training for public sector employees. Administrators must identify which way the individual prefers to learn so that this method can be applied to local training practices. Within this work the author investigates theories of many researchers including Kolb, Dewey, and Sperry. Functions of individuals with right or left hemisphere thinking processes are examined as is the dynamic ongoing learning process.

Learning theory is very important to the value and validity of any training program. Without knowing how people learn it would be difficult to evaluate the effectiveness of training. In their book on learning, Morgan and Saxton (1991) examine the vital components of how people learn. The work endeavors to present the differences in student aptitudes by studying the implications of cognitive learning. A look into the psychology of learning is also provided. Key points on related techniques for teaching and development of questions are also examined in this work.

Information on the importance of providing a goal to trainees is exhibited by Blanchard and Johnson (1982). This work devoted to management techniques provides important principles for determining the goals of individuals.

The importance of setting a goal during development of any program is paramount. Without goals, participants in a training program would quickly lose interest and possibly become a deterrent to training.

Bloom (1976) provides a classical and helpful interpretation of the definition of cognitive learning. The importance of cognitive entry behaviors are discussed, as is the relevance of prior training to successful learning in people. Many statistical results from previous studies are also reviewed. Special attention is given to the influence of subsequent achievement by students based on cognitive learning in the past. Cognitive learning concepts are then applied to reveal the quality of learning predicted in future educational attempts by the student.

Federal Regulations

The Federal Aviation Advisory Circular (AC) on airport emergency planning (1989) is probably the number one authoritative document when it comes to emergency training. The AC gives detailed information on the development, planning, training, and execution of airport emergency plans. Formats are provided for training the multitude of public and private sector agencies that may be required to respond to an airport mishap. This document provides excellent start-up data for airport operators beginning new training programs.

The Federal Aviation Advisory Circular (AC) on airport training of aircraft rescue and fire fighters (1994) provides a step-by-step check list on priorities for training programs. Training topics like aircraft familiarization and emergency evacuation assistance are described in great detail. Additionally, a comprehensive listing of FAA sponsored agencies that provide emergency response training is presented within the advisory circular.

Federal Aviation Regulation 139.325 g,4, (1988) Certification and Operations: Land Airports Serving Certain Air Carriers requires airport certificate holders to review emergency plans yearly. The annual review of emergency plans must include all mutual-aid participants responsible for assisting the airport. In addition, FAR 139 also requires a full-scale disaster exercise at least once every three years. This three-year requirement may not be enough to ensure participants' adequate training. The impact of a full-scale disaster exercise can be devastating on any certificated airport's financial resources. The current federal regulations leave airports with an unacceptably long length of time between training exercises. In addition, the requirement to meet with participating agencies once every year is vague and prescribes no training methods whatsoever.

The National Transportation Safety Board Part 830 Notification and Reporting of Aircraft Accidents (1988) gives a definitive identification of what an aircraft accident is. The document discusses primary definitions of accident as opposed to incident, public aircraft, serious injury and many other terms. In addition to defining the mechanics of aircraft mishaps Part 830 provides procedures for initial notification of accidents, incidents, and overdue aircraft. In the final section of the document the NTSB identifies necessary reports and statements needed to be generated by participants of the accident investigation.

Emergency Response

A collective work on approved methods in emergency response is provided by Carlson & Murnane (1992). In this source the International Fire Service Training Association provides accepted practices, methods, and procedures for training and actual emergency response. Detailed descriptions of proposed planning and training outlines are also provided. Additionally, the manual provides detailed explanations of accepted practices and standard operating procedures and follow-up study questions.

Dealing with the causes of stress in aircraft passengers is provided by Edwards (1991). Examining the flight or fright syndrome in airline passengers can help to determine the most expeditious way of handling emergency situations. Valuable strategies for managing fearful passengers are also discussed.

An in-depth look into the causes of airline accidents is presented by Duke (1991). The evaluation and examination of several aircraft accidents involving large transports reveal many recommendations for changes in procedure.

In summary, the use of simulation training (Table Top) in conjunction with gaming theory has been a long-time training aid for both the military and business communities. Fifteen of the literary works reviewed are supportive in nature towards the stated hypothesis. The remaining literary works reviewed are considered vital for development of the thesis.

Statement of the Hypothesis

As a result of table top simulation training, operational readiness of airport emergency response crews will be improved. Prior literature shows the dramatic effect of using gaming theory simulation training to improve the decision-making skills of managers. After posing the question of whether table top training will improve operational readiness of emergency crews, it is hypothesized that airport directors will respond favorably to this idea.

Chapter 2

Method

Subjects

The subjects for this study were selected from the population of all responding airport directors--or their designated representatives--surveyed by means of questionnaire. The state of Florida was selected because of the relative similarities in training between airports. The availability of a well developed table top training program maintained by the Florida Division of Emergency Management was also attractive to the researcher. Team-oriented agencies providing emergency response to a specific airport must be tested as a group and not individually. For this reason, any small, regional, or international airport would serve the purpose for applying the theory of emergency response readiness. Researchers have identified specific ideals based on effectiveness training and how people learn in a public sector employment environment.

In addition to examining the potential gain in training effectiveness of individuals, airport agencies were also evaluated. The airport director was identified as the agency authority on training and employee development. Because each airport is not identical a statistical evaluation was conducted to determine if airport size could be a factor.

A sample bias was anticipated with respect to both size of aircraft and the number of passengers arriving at a given airport. Airport size did not, however, affect the overall results of the survey. The desired sample size for this evaluation was 70% of the 27 airport agencies surveyed. A random selection of results was obtained through the natural selection of surveys that were completed and returned to the researcher.

Instrument

The instrument for this study was exclusively developed for this research project and took the form of a questionnaire consisting of 20 separate questions. The survey form consists of four major sections and can be seen in its entirety in Appendix B of this document. The first section of the survey was concerned with the collection of demographic information from the survey group. Age, current years in job, gender, and the current duty position held by the participant were all recorded within the demographic section. Government agencies having ownership over participating airports were categorized as either city, county, or authority and were also selected from the demographic section.

The second part of the survey consisted of a single simulation table top question and accompanying scenario. This section provided a visual aid in an effort to demonstrate table top training to participants.

The second and third portions of the survey were both depicted on the front side of the survey format. Within the third portion of the survey is contained the most vital and in-depth study information pertaining to the table top value and development. This section consists of nine literal statements in a Likert format that are reviewed by the participant and judged as strongly agree, agree, no opinion, disagree, and strongly disagree. The thesis hypothesis is also proved in this survey section.

The final section consists of four questions, three of which ask the respondent to give a yes or no reply. In addition to the yes and no questions, subjects were asked in the last question to identify any table top training being used at their airport. A space was provided at the end of the survey for any comments the participant chose to make. Written comments collected in the survey can be seen in appendix C of this paper. The fourth section of the survey provides much needed information on the current and future use of table top training at each participant's airport.

Design

The research methods used in this study are the descriptive and historical methods as outlined in the textbook Educational Research by Gay (1992). These methods of research were chosen because the problem requires determining the readiness level of professionals at their stage of development.

Analyzing new data during collection of questionnaires and surveys makes descriptive research ideal for this project. Use of historical research in the collection of passenger enplanement statistics was also valuable in providing a basis for statistical analysis of the data. The size and enplanement information was needed to answer the question as to whether the size of a facility would have any impact on the answers provided in the survey.

Data Analysis Procedures

The Chi Square method of statistical analysis was used to determine that no significant difference existed in the answers provided by large and small airport participants.

> Statistical significance corresponds to small probability that the result observed is due to sampling error; a decision about the practical significance of a statistical result frequently may involve other factors as well. A statistician does not become annoyed by the fact that he cannot tell anyone the exact value of the parameter he is trying to estimate. (O'Toole, 1964, pp. 20)

In other words, a significant statistical difference is one which is determined to be more than a difference likely to occur simply by chance. For the purpose of this study the idea of significant difference has been applied to the relation between large and small airports.

The survey group was selected from a population of 27 large and small airports within the state of Florida. The respondents consisted of a group of 20 airport directors or their designated representatives. The critical variable controlled in this study was the ability of randomly selected members, each at a different training and experience level. Variables which are uncontrolled within this study were identified to be the tendency of individuals to respond to survey questions using personal judgement. Pilot studies are not necessary, but would aid in development of the simulation training exercise. Any question as to whether the variable is controlled or not will be determined by the researcher.

Procedures

The actual determination of whether or not table top exercise increases the operational readiness of emergency response crews was an objective opinion. Each individual within the organization would have a separate opinion as to the effectiveness of table top training. Another factor that might affect the outcome of survey results is the relative size of the airport. A question arose as to the relative size of each airport with relation to passenger enplanements per year and its effect on survey results.

To get the most objective and learned opinion on the subject a question was posed to the highest ranking official within each airport administrative agency. Surveys were sent to airport directors of several large, medium, small, and non-hub facilities. The directors were asked to provide all the information requested within the survey, and for the most part they chose to comply. In some cases representatives of the director did complete the surveys. Where a representative was chosen by the director to complete the survey, that representative did in all cases occupy a high-ranking position within the organization.

Chapter 3

Data Analysis

Primary Data Analysis Procedures

Data collection was accomplished by mailing out 27 individual surveys on August 2, 1994. Each survey consisted of 20 questions and was designed to be answered by a sample group of airport directors or their designated representatives. Each airport was selected on the basis that it performed operations in accordance with Federal Aviation Regulations. Sixteen of the airports surveyed responded within two weeks after the first instrument was distributed. The remaining airports were surveyed again on September 2, 1994 using the exact same format as the first with the exception that the cover letter mentioned the first survey. From the second request for survey data came a remaining four responses all within two weeks, providing for a total response of 20 participants. A copy of all survey results was prepared and sent out to each participant who responded to the study. Demographic information was obtained from each participant through the use of the first six survey questions. Tables one through six show a representation of data collected concerning the demographic analysis of the survey group.

A statistical analysis was completed which examined the significant difference between those surveyed airports determined to be large and those smaller airports. A null hypothesis was developed stating that no significant difference existed between the answers provided by small airports and those provided by larger ones. Results from the analysis are shown in Appendix D. Values for the analysis were derived from table 6 as found in Elzey (1971). By examining a critical values table for Chi Square it can be found that with 4df degrees of freedom and a probability of P = .05 a value of at least 9.49 must be found before a significant difference can occur between data sets. No statement analyzed showed a Chi Square value above that of the equation shown below:

$$X^2(4, N=20)=5.715, p<.05$$

The following tables represent a frequency distribution for 20 questions based on the sample group of 20 participating airport administrators. The sixth question refers only to the airport name and address and has been used to display the estimated annual enplanements of each participating airport. Each table reflects the percentage of response to that question being reviewed in relation to the total number of responses collected during the survey. The number of respondents who chose not to answer is also shown

Demographics

Information was gathered on the demographic composition of the survey group. In addition to asking questions on age, gender, time in job position, and duty assignment this section also examined the sponsoring agency for each airport.

Table 1

The Age of Survey Respondents

	(N)	(%)
Age		
18-30 years	3	15.0
31-40 years	5	25.0
41-50 years	2	10.0
51-60 years	6	30.0
61-over years	2	10.0
No answer	2	10.0
Total	20	100

Within the response to question one the representative age of participants can be seen in Table 1 as a mature sample group. Fully 75 percent of the group were over the age of 30 years, while out of that group 30 percent were between the age of 51 and 60 years old. In this question ten percent of the participants chose not to answer.

Table 2

Number of Years Served in Current Job Position

	(N)	(%)
Years		
1-5	8	40.0
6-10	3	15.0
11-20	4	20.0
21-over	3	15.0
No answer	2	10.0
Total	20	100

By reviewing the response to question number two the survey sample shows in Table 2 a majority of participants to have less than six years in their current duty position. Fully 20 percent of the sample showed that they had held the same job for over 11 years while only 15 percent had stayed past 20 years in the same job. The participants surveyed who chose not to answer this question comprised 10 percent of the group.

Table 3

Participant Gender

	(N)	(%)
Male	18	90.0
Female	2	10.0
Total	20	100

Upon examining the responses to question three it was discovered that 90 percent of the sample group was male (See Table 3). Because of the large majority represented by one gender, no examination into the effect of male or female response was made during the study.

Table 4

Respondent's Job Title

	(N)	(%)
Director		
Airport	11	55.0
Police	1	05.0
Fire	0	00.0
Other	7	35.0
No answer	1	05.0
Total	20	100

Out of the 20 participants surveyed 35 percent identified themselves as other than director of the airport (see Table 4). Out of the seven participants in the category labeled "other" one was department manager, three were assistant to the airport director, and three were director of operations. Fully 55 percent of the survey was answered by the airport directors, while 40 percent of respondents were designated representatives of the director. Out of those who answered the survey 5 percent chose not to complete statement four.

Table 5

The Controlling Government Agency

	(N)	(%)
Owner		
City	5	25.0
County	5	25.0
Authority	8	40.0
No answer	2	10.0
Total	20	100

Within this statement can be seen the type of governing authority over which the airport is controlled by (see Table 5). Exactly 25 percent of the participants reported that their airport was owned by a city or a county. Fully 40 percent of the agencies surveyed were owned by an airport authority. Respondents who chose not to complete this statement comprised 10 percent of the survey group.

Table 6

Airport Location, Identification, and Enplanements

City name	IATA Code	Enplanements
Miami	(MIA)	14,030,586
Orlando	(MCO)	10,246,596
Tampa	(TPA)	5,046,940
Ft. Lauderdale	(FLL)	4,512,638
Ft. Myers	(RSW)	1,815,112
Sarasota	(SRQ)	877,433
Tallahassee	(TLH)	441,018
Pensacola	(PNS)	436,421
Melbourne	(MLB)	321,125
Key West	(EYW)	219,540
Gainesville	(GNV)	183,009
Panama City	(PFN)	159,012
Ft. Pierce	(FPR)	100,000*
Naples	(APF)	62,883
Marathon	(MTH)	28,184
Sanford	(SFB)	24,447*
Vero Beach	(VRB)	14,546*
Lakeland	(LAL)	11,421*
Charlotte	(PGD)	5,340*
Ocala	(OCF)	3,140*

* information provided by the airport administrative staff.

Table 6 was derived from source material provided by the American Association of Airport Executives.

Table top Value and Development

Survey questions directly pertaining to the value and development of table top training in airport emergency response were answered by statements 7 through 15. Statements referring to the anticipated value and development of table top exercises were based on a Likert scale format. The following indications were given: (1) strongly agree, (2) agree, (3) no opinion, (4) disagree, (5) strongly disagree.

Table 7

Survey Question: Table top Simulation Training Would Help Improve Operational Readiness of Emergency Crews at my Airport

	(N	(%)
Response		
Strongly agree	12	60.0
Agree	7	35.0
No opinion	1	05.0
Disagree	0	00.0
Strongly disagree	0	00.0
No answer	0	00.0
Total	20	100

Information derived from question seven showed 95 percent of the survey group believed that table top training would improve operational readiness in their airport. This statement supports the thesis hypothesis (see Table 7) Fully 60 percent of the group surveyed strongly agreed with this principle. From this statement, 5 percent of the survey group had no opinion on the subject as seen in Table 7.

Table 8

Survey Question: Table top Simulation Training Should use Scenarios Based on Actual Aircraft Mishaps

	(N)	(%)
Response		
Strongly agree	6	30.0
Agree	11	55.0
No opinion	3	15.0
Disagree	0	00.0
Strongly disagree	0	00.0
No answer	0	00.0
Total	20	100

In this statement 85 percent of the survey group believed that table top training should use actual aircraft mishaps as a model for scenarios (see Table 8). Fully 35 percent of the group surveyed said they strongly agreed with this principle. Additionally, 15 percent of the survey group had no opinion on this subject.

Table 9

Survey Question: Table top Simulation Training Should Provide the Participants an Opportunity to Select the Highest Priority Response in a Scenario

	(N)	(%)
Response		
Strongly agree	4	20.0
Agree	11	55.0
No opinion	3	15.0
Disagree	1	05.0
Strongly disagree	0	00.0
No answer	1	05.0
Total	20	100

Results showed that 75 percent of the survey group believed that table top training should allow the participants to select the highest priority or, in other words, the most urgent reply to a scenario question (see Table 9). Fully 20 percent of the group surveyed said, they strongly agreed with this principle. The study showed 15 percent of the survey group had no opinion on the subject of highest priority. Additionally, five percent of the survey group disagreed with this statement, and one participant chose not to reply to the question.

Table 10

Survey Question: Table top Simulation Training Should Include all Personnel That may be Required to Respond to an Actual Emergency

	(N)	(%)
Response		
Strongly agree	8	40.0
Agree	6	30.0
No opinion	1	05.0
Disagree	4	20.0
Strongly disagree	1	05.0
No answer	0	00.0
Table	20	100

By reviewing information in Table 10, 70 percent of the survey group did believe that table top training should include all emergency response personnel. From the majority who supported this idea 40 percent of the group surveyed strongly agreed with this principle. A group of 5 percent in the survey had no opinion on this subject. Additionally, 20 percent of those surveyed disagreed with the idea that all personnel required to participate in emergencies should use table top training. Out of those who disagreed 5 percent of the survey strongly disagreed with this idea.

Table 11

Survey Question: Table top Simulation Training is no Substitute for Actual Hands on Training

	(N)	(%)
Response		
Strongly agree	5	25.0
Agree	7	35.0
No opinion	2	10.0
Disagree	4	20.0
Strongly disagree	2	10.0
No answer	0	00.0
Total	20	100

Results showed that 60 percent of the survey group believed table top training was not a substitute for actual hands on training (see table 11). A representation of 25 percent within the group surveyed said they strongly agreed with this principle. The group surveyed had 10 percent who chose to express no opinion on this subject. Out of 30 percent who disagreed with the statement, 10 percent of those strongly disagreed.

Table 12

Survey Question: Table top Simulation Training Should Include a map of the Airport to Allow for Movement of Gaming Pieces and Visual Association

	(N)	(%)
Response		
Strongly agree	10	50.0
Agree	9	45.0
No opinion	1	05.0
Disagree	0	00.0
Strongly disagree	0	00.0
No answer	0	00.0
Total	20	100

Examination of the data showed 95 percent of the survey group believed that table top training should include a map to allow for movement of gaming pieces and visual association. Fully 50 percent of the group surveyed said they strongly agreed with this principle as seen in Table 12. Additionally, 5 percent of the survey group had no opinion on this subject.

Table 13

Survey Question: Table top Simulation Training Should be Based on the Airport Emergency Plan

	(N)	(%)
Response		
Strongly agree	15	75.0
Agree	5	25.0
No opinion	0	00.0
Disagree	0	00.0
Strongly disagree	0	00.0
No answer	0	00.0
Total	20	100

Research reviled that 100 percent of the survey group believed table top training should be based on the Airport Emergency Plan (see Table 13). From this majority 75 percent of the group surveyed strongly agreed with this principle.

Table 14

Survey Question: Table top Simulation Training Should Provide a Rule Book to all Participants

	(N)	(%)
Response		
Strongly agree	4	20.0
Agree	5	25.0
No opinion	9	45.0
Disagree	2	10.0
Strongly disagree	0	00.0
No answer	0	00.0
Total	20	100

Respondents' results showed 45 percent of the survey group believed that table top training should provide a rule book to participants, with 20 percent strongly agreeing. Additionally, 45 percent of the group surveyed said they had no opinion on this subject (see Table 14). Ten percent of the survey group disagreed with the idea of providing a rule book to participants of table top training.

Table 15

Survey Question: Table top Simulation Training Should Include a Debriefing Session After the Training to Identify Strengths and Weaknesses

	(N)	(%)
Response		
Strongly agree	16	80.0
Agree	3	15.0
No opinion	0	00.0
Disagree	0	00.0
Strongly disagree	0	00.0
No answer	1	05.0
Total	20	100

As seen in Table 15 this statement showed 95 percent of the survey group believed that table top training should use a debriefing session after training to examine strengths and weaknesses within the session. Fully 80 percent of the group surveyed said they strongly agreed with this principle. In addition, 5 percent of the survey group chose not to respond to this statement.

Current and Future Use of Table top

Questions 16 through 19 of the study concerned the application of table top training currently being used on airfields. Additionally, these questions also explored the possibility of future table top use by participating airports.

Table 16

Survey Question: Currently Table top Training is Used at my Airport

	(N)	(%)
Response		
Yes	15	75.0
No	5	25.0
No answer	0	00.0
Total	20	100

Examination of the data in Table 16--concerning current utilization-- showed 75 percent of the survey group said that table top training was used at their airport. Respondents to the study who replied no to this statement comprised 25 percent of the survey group.

Table 17

Survey Question: I Would Like to see Table top Training Like the one Described in the Questions Above Used at my Airport

	(N)	(%)
Response		
Yes	13	65.0
No	2	10.0
No answer	5	25.0
Total	20	100

In response to this question 65 percent of the survey group stated that they would like to see table top training, similar to the survey example, at their airport. Out of the group 10 percent surveyed said no to this statement. In addition, 25 percent of the survey group chose not to respond to this statement (see Table 17).

Table 18

Survey Question: I Would Like to Have a Copy of the Survey Results

	(N)	(%)
Response		
Yes	20	100.0
No	0	00.0
No answer	0	00.0
Total	20	100

In regard to the statement that they would like to have a copy of the survey results, seen in Table 18, 100 percent of the participants said yes.

Table 19

Survey Question: Describe any Table top Training Being Used at Your Airport by Circling one of the Choices Below

	(N)	(%)
Response		
Discussion only	4	20.0
Gaming and Discussion	8	40.0
Scenarios	2	10.0
No current table top training	1	05.0
No answer	5	25.0
Total	20	100

Analysis of the data showed that 20 percent of the survey group said discussion table top training only was being used on their airport. The majority of 40 percent within the group surveyed said they used gaming and discussion both at their airport as seen in Table 19. Subjects who said table top scenario training was being used in their agency comprised 10 percent of the group surveyed. Additionally, 5 percent of the sample said no table top training was being used whatsoever in their agency. In all, 25 percent of the survey group chose not to respond to this statement.

In an effort to provide a visual format for simulation scenario training a sample scenario was provided within the body of the survey. The following instructions were given with the sample:

Use the following information to respond to the example scenario in the box below concerning table top simulation training. Note: A hidden value of between one (1) and five (5) has been assigned to each response below with five (5) being the worst choice. Choose the best response to the simulation given below by selecting the number one (1) choice. The following scenario was provided:

Immediately after an aircraft mishap, firefighters discover a possible explosive device lodged in the wreckage. The airline station manager requests immediate transport of a maintenance representative from the terminal building to the command post at the accident site. This escort will require one operations agent and one unit ten minutes.

Table 20

Responses to Survey Sample Scenario

	(N)	(%)
Response		
Request denied, the airline station manager has no authority in this matter.	9	45.0
Provide assistance as requested, but remember that time and vehicles may be in short supply.	5	25.0
Ask airport police to transport the representative.	3	15.0
Arrange transport to the site on board the next available ambulance heading out there.	0	00.0
No Response	3	15.0
Total	20	100

As seen in Table 20, 45 percent of the survey group responded to the sample scenario by selecting the first response. In addition, 25 percent responded with the second choice, while 15 percent selected the third choice. Respondents to the survey that chose not to make a selection comprised 15 percent of the survey group.

The second phase of data analysis was to apply statistical analysis to the primary data described in the tables above. A statistical analysis was not performed on data collected within the demographic or test scenario sections of the survey.

The first step was to establish the mean size for the survey group of airports. The size of each airport was determined by reviewing the number of annual enplanements for that airport. This separation point is easily understood when the size and location of each airport is taken into account. Larger airports were located near greater population centers and were affected by high density seasonal traffic patterns. Smaller airports relied on more localized traffic of small commuters and corporate aircraft as well as a large general aviation base. The natural break between large and small airports was found to be between Sarasota/Bradenton and Tallahassee. Sarasota at the lower end of the large group experienced nearly nine hundred thousand annual enplanements, while Tallahassee was far below five hundred thousand. In addition to the main survey a pilot questionnaire was administered to seven volunteers, and their responses were examined to form the final survey format.

Chapter 4

Conclusions and Recommendations

It was anticipated that the results of this study would support the research hypothesis that operational readiness of airport emergency crews can be improved with the use of table top simulation exercises. It was further hypothesized that no significant difference in the reported effectiveness of table top training would occur between administrations of two significantly different size groups of airports.
The conclusions were based upon the results of the data gathered in the descriptive and historical research methods. An additional comparison was made using the Chi Square method of analysis as depicted in Elzey (1971). Statistical analysis of survey responses found no significant difference between the responses of large and small airport participants. Results from the Chi Square analysis of value and development survey questions can be found in Appendix D of this document.

Conclusions

This study was conducted for the purpose of developing two primary goals. The first goal has been the determination of whether or not table top simulation training exercise will improve the operational readiness of emergency response crews.

According to Bloom (1976) potential increases in future learning ability can be greatly increased by the presence of prerequisites or cognitive entry behaviors. The use of table top simulation can aid in developing prerequisite training prior to other forms of airport training tasks. The second goal of this study is to provide a basis for development of a strong and effective simulation training plan founded in the expert opinion of airport administrators.

Demographic information presented in the survey shows that the response group is primarily composed of adult males who are over the age of 30 and currently occupy a supervisory position. Eighty-five percent of the survey group is found to be over the age of 30, while only ten percent of those responding are female. Demographic response shows that the majority of participants in the study have not held their current duty position for a long time. Only 20 percent of the sample surveyed are currently occupying that position for more than 11 years. Only high-ranking supervisors within the agencies examined responded to the survey. Fully 55 percent of the survey group are comprised of airport directors, while an additional 35 percent are either directors of operations or assistants to the airport director.

Within the question of controlling agency for each participating airport the majority are found to be governed by an Airport Authority. Finally, within the group of participating agencies it is seen that a comprehensive representation with respect to size of airport is demonstrated. Airports with passenger enplanements of from 3,140 to 14,030,586 per year are examined in this survey. Statistical analysis of the survey group shows that no significant difference occurs between the response of smaller airports and that of larger ones. Because of this analysis all data collected within the survey is determined to be relevant as a whole group. It is therefore concluded that:

1. The survey group is composed primarily of middle-aged men who occupy a senior administrative position within their organization. The study reveals that participants represent a conservative and experienced group of experts who possess a high degree of judgement in the area of airport administration. From this analysis it can be stated that the survey objective of examining supervisory expert opinions in this field with regard to airport emergency response has been accomplished.

2. As a result of table top simulation training, operational readiness of airport emergency response crews will be improved. Within the table top value and development portion of the survey participants answer this primary hypothesis of the thesis. Additionally, the developmental questions help to identify the important components of a successful table top training program. Asked if table top simulation training would help improve operational readiness of emergency crews at their airport 95 percent of the survey participants say it will. No dissenting opinion is given by any of the participants which leads to the conclusion that the hypothesis is correct.

3. Actual aircraft mishaps should serve as role models for simulation training scenarios. Eighty-five percent of the survey group believe this to be true. One airport administrator from a large facility stated that "aircraft incidents and accidents at other airports can provide lessons for our airport." The survey asks if participants in table top exercises should select the highest priority response in a scenario. By highest priority the study maintains that the most urgent selection from the set of solutions to a scenario should be chosen by a table top trainee. Question nine shows that 75 percent of the survey group believe the highest priority selection should be made. Only five percent of the participants disagree with question nine.

4. All personnel that may be required to respond to an actual emergency should be allowed to participate in table top training exercises. Survey results show 70 percent give a positive reply to this statement. Lieutenant Kevin Ward of the Port Authority of NY and NJ recently said, "all the years of staging `mock' drills, involving all the responding agencies, gave us the ability to perform our assigned duties when the time came to do so" (Ward, 1994, pp. 2). The majority of participants believe any employee of an agency expected to respond to an airport emergency should be allowed to participate in table top training exercises. Participants' response to question 11 that table top is *no* substitute for actual hands-on training was 60 percent. When compared to previous study questions this percentage is relatively low. Additionally, fully 25 percent of the study group disagree with this statement. A conclusion can be drawn from the results of question 11 that a significant number of subjects believe table top training does provide a substitute for actual hands on training.

5. An airport map should be used along with gaming pieces to provide for visual association during table top training. Ninety-five percent of the professional administrators believe that the use of an airport map is a vital component to table top training exercises. Question 13 showed that 100 percent of the respondents believe that table top training should be based on the Airport Emergency Plan.

Airport professionals feel that the Emergency Plan is a basic reference source for table top training of response crews. Statement 14 shows that a majority of participants had no opinion about whether a rule book should be provided to explain gaming rules of table top exercises to players. When the positive result is compared to the negative in this question, however, 45 percent agree in a rule book being provided and only ten percent disagree with this principle. The results seem to state that a majority of airport professionals who understand the question prefer to have a rule book provided to table top trainees. The final statement in the value and development section shows that 95 percent of the sample group believe that a debriefing session is an intricate part of a successful table top training plan.

6. An overwhelming majority of airport executives believe table top training will improve operational readiness of emergency crews at their airport. Furthermore, this group of aviation professionals believe that table top training should include scenarios based on real aircraft mishaps and that choosing the highest priority response is very important. All personnel who may be called upon to respond to an airport emergency should be allowed to participate in table top training. Table top training should also provide personnel with a map of the airport to allow for gaming pieces to be used during the simulation exercise.

Any simulation training should be based on the Airport Emergency Plan and must allow for a good debriefing session afterwards. In considering the use of table top training as a substitute for hands-on evaluation it is concluded that this is not a good practice and should be avoided. One airport assistant director reported that "our last table top combined the advantages of hands-on training with the convenience of round table discussion." Perhaps the possibility of combining table top with hands-on mock drills would be a better alternative to substitution. A conclusion based on the use of rule books, however, for training table top participants is clearly identified by the study. As many people surveyed say that they agree with the concept as do those who have no opinion on this topic. Additionally, only 10 percent of the survey respondents disagree with the use of rule books. Because of the tremendous benefit in supplying adequate information to the participant of a simulation training exercise, a sample rule book has been provided in Appendix E.

7. The final section of the survey examines the current and future usage of table top actually going on or anticipated at participant airports. Additionally, the usage portion of the survey provides a comments section, the results of which can be seen in appendix C. Based on the information provided in the later part of the survey it is therefore concluded that:

Seventy-five percent of the survey group state they currently use some form of table top training at their airport. Therefore most airport directors surveyed believe table top is a viable training tool. A yes answer is given by the majority of survey participants who would like to see future use of scenario table top training--similar to the one described in this study--at their airport. This question helps to identify prospective participants to follow-up studies on simulation exercise. One-hundred percent of the survey subjects indicate that they would like to see the survey results. A conclusion can be made that wide-spread interest in the results reflects an interest in developing simulation scenario training. The majority of responses to the final question show that gaming and discussion techniques currently are used in most of the table top training at survey airports. Additionally, discussion alone with no other aid is used in the second highest majority of airports. A small minority of airports report the use of scenarios in current training.

8. Overall, the conclusion from the survey section on development can be seen as: Current use in table top training consists primarily of discussion sessions with a substantial amount of gaming in use. It would appear from the survey information studied that airport administrators would like to use more scenario type table top training then is currently being done at their airports.

This observation is reinforced by the majority of positive responses to statement 12 concerning the use of scenarios. Current use of scenarios--by survey airports--is relatively small when compared to that of discussion-only training sessions. The interest level, however, in scenario simulation results from question 18 show a 100 percent majority. Finally, the survey group reports that a majority of respondents wish to see future use of scenario training like the one described in the study at their airport. These observations show that airports currently using discussion and other training techniques prefer to see more scenario technique in future table top exercises.

Recommendations

Previously within this study reference has been made to the use of table top training by military agencies in an effort to build decision-making skills. Airport emergency crews must learn to fight a powerful enemy known as complacency. Simulation training can be used to overcome this complacency while serving to increase operational readiness. Current Federal Aviation Regulation mandates a three-year requirement for emergency drills for all FAR 139 airports. During that time many events take place which can affect the complacency of emergency response crews. Turnover rates in personnel within the airport operations, fire, and police sections can be devastating to a training program.

This problem is multiplied by the effect of turnover in supporting agencies like state and local police, fire, and emergency medical evacuation agencies. The airport director must be responsible for ensuring that complacency in the face of a three-year waiting period is not aggravated. A recommendation is made for the increased use of table top training with airports and their outside counterparts so as to overcome the loss of experience due to turnover rates in personnel levels.

Cost involved in the actual calling out of all the agencies responsible to an airport emergency can be astronomical. Not only will the state and local police need to be involved, ambulance, hospital, and even the FBI might be called in during a typical airport mock drill. Not only would professional agencies and personnel be called upon to train in a full-scale drill, but the use of volunteers in large numbers would also need to be coordinated, sheltered, and fed during the exercise. The cost in equipment for the use of just one fire truck can run into hundreds of dollars during the day. When multiplied by the complete contingent of vehicles, vessels, and aircraft that can be involved in a triennial exercise the cost of training becomes astronomical.

Table top training can be the answer to a successful triennial exercise. Because the training can be used for as few as two or as many as thirty people at one time cost no longer becomes a primary factor.

Table top training can also be used at night, when crews are not engaged in other duties, or scheduled during the day for special training sessions. Because of its relative economy table top can be used to increase operational readiness in response crews as evidenced in this study. It is recommended that table top simulation exercise be used as a prerequisite to the FAR Part 139 requirement for tri-annual mock drill of all participating agencies. In doing so the airport ensures an effective and responsive training session.

Because of the adaptability of simulation training programs to the aerospace industry recommendation for future research projects is unlimited. For the purpose of clarification, however, the suggested follow-up research topic for this thesis involves an experimental research program as explained by Gay (1992). A group of airport emergency response personnel should be recruited and divided into two separate randomly selected sub-groups. In this way the first group can be evaluated as experimental while the second is used for control purposes. The basis for this study would be to develop an experimental table top training plan and test it to see if improvement results from its use.

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APPENDIX A:
INITIAL SURVEY COVER LETTER

APPENDIX A: INITIAL SURVEY COVER LETTER

William E. Vines
PO Box 10922
Daytona Beach, FL 32120

August 19, 1994

Mr. R. Port, Director
Any Regional Airport Authority
3400 Airport Road, Suite A
Any Town, FL 32000

RE: Everyone would like to save time and money.

Dear Mr. Port:

Preparing for the triennial and annual emergency planning requirements of FAR 139 can be time-consuming and costly for any airport staff. Because of its simplicity table top training may prove to be the answer to timely compliance of this federal regulation.

I am currently involved in a research project targeted towards determining what a table top plan should contain. Would you please take a few minutes to complete the enclosed survey and help determine if table top training is a viable solution to this problem. Many other airports are being surveyed and confidential results will be available to all participants.

Completed surveys should be returned by September 2, 1994 and a self-addressed stamped envelope is provided for your convenience. Feel free to call me at (904) 760-3029 if you have any questions. Your participation in this survey is greatly appreciated and I thank you.

Sincerely,

William E. Vines
Graduate Student, Embry-Riddle Aeronautical University

Enclosure

APPENDIX B:

Emergency Response Simulation Training Survey

APPENDIX B: EMERGENCY RESPONSE SIMULATION TRAINING SURVEY

Name _____
Phone _____

Circle the response below that most closely describes you.

1. Age: 18-30 31-40 41-50 51-60 61-over

2. Years at position: 1-5 6-10 11-20 21 and Over

3. Gender: Male Female

4. Director of: Airport Police Fire Other_____

5. Airport Owner: City County Authority

6. Airport Name: _____

Address: _____

Use the following information to respond to the example scenario in the box below concerning Table Top Simulation Training. Note: a hidden value of between one (1) and five (5) has been assigned to each response below with five (5) being the worst choice. Choose the best response to the simulation given below by selecting the number one (1) choice.
Immediately after an aircraft mishap, firefighters discover a possible explosive device lodged in the wreckage. The airline station manager requests immediate transport of a maintenance representative from the terminal building to the command post at the accident site. This escort will require one operations agent and one unit ten minutes.
Write a [1] in the brackets next to the best response.

[_] Request denied, the airline station manager has no authority.
[_] Provide assistance as requested, but remember that time and vehicles may be in short supply.
[_] Ask airport police to transport the representative.
[_] Arrange transport to the site on board the next available ambulance heading out there.

Circle the number that best describes your idea of the following.
(1) strongly agree, (2) agree, (3) no opinion, (4) disagree,
(5) strongly disagree.

Table Top Simulation Training:

7. (1 2 3 4 5) would help improve operational readiness of emergency crews at my airport.

8. (1 2 3 4 5) should use scenarios based on actual aircraft mishaps.

9. (1 2 3 4 5) should provide the participants an opportunity to select the highest priority response in a scenario.

10. (1 2 3 4 5) should include all personnel that may be required to respond to an actual emergency.

11. (1 2 3 4 5) is no substitute for actual hands on training.

{OVER}

12. (1 2 3 4 5) should include a map of the airport to allow for movement of gaming pieces and visual association.

13. (1 2 3 4 5) should be based on the Airport Emergency Plan.

14. (1 2 3 4 5) should provide a rule book to all participants.

15. (1 2 3 4 5) should include a debriefing session after the training to identify strengths and weaknesses.

YES or NO

Please answer all of the following.

yes / no Currently Table Top training is used at my airport.

yes / no I would like to see Table Top training like the one described in the questions above used at my airport.

yes / no I would like to have a copy of the survey results.

Describe any Table Top Training being used at your airport by circling one of the choices below:

Discussion only	Gaming and Discussion	Scenarios only	No Table Top Training

Please include additional comments below.

Completed surveys should be returned by August 15, 1994 in the self-addressed stamped envelope to William E. Vines, PO Box 10922, Daytona Beach, FL 32120. Any questions can be directed to Bill at (904) 760-3029. Thank you for your kind attention.

APPENDIX C:

Additional Survey Comments

APPENDIX C: ADDITIONAL SURVEY COMMENTS

1. Table top should be designed to build proficiency and increase knowledge. Before having a table-top for a full blown emergency , build a foundation with "mini-table-tops" such as: Staging for Law Enforcement (LE), Airport Rescue and Fire Fighting (ARFF), and Emergency Medical Service (EMS) units; site security, escorts and crowd/media control; a PIO exercise with media participants, etc.
Build your cake piece by piece and then throw a party for the whole gang with a day long, full-blown table top exercise. Director of Operations.

2. This is an important training area for all airports. Assistant Airport Director.

3. Annual Exercise, Airport Director

4. Aircraft incidents and accidents at other airports can provide lessons for our airport. Scenarios developed as hypothetical situations are used to consider local conditions. It is important to remember that aircraft accidents are only one section of our airport emergency plan. FAR 139.325 requires emergency response procedures for many other types of airport emergency situations and table top simulations can be used to test those procedures as well. [Position not stated]

5. Our last "Table Top" combined the advantages of hands-on training with the convenience of round table discussion. Our exercise was in two parts: 1. A limited mock disaster on the airfield where all responding parties participated (but with no moulage/volunteers and no press), and 2. A table Top discussion of the events which transpired at the scene. We called it a "Mini-Mock" and it was well-received by Fire Department (FD), EMS, Airport Management, and police. Airport Assistant Director.

6. Contact this ARFF unit at Copenhagen, Kastrup Airport, they have the neatest simulator that I have ever seen. It is the whole upstairs of their fire station. A layout of the entire airfield and can simulate a night operation as well. It is far advanced over anything I have ever seen in the U.S. Airport Director.

APPENDIX D:

CHI SQUARE ANALYSIS OF SURVEY QUESTION RESULTS

APPENDIX D: CHI SQUARE ANALYSIS OF SURVEY QUESTION RESULTS

The Null hypothesis for this analysis was that there is no difference between large and small airport responses to the survey value and development questions presented within this thesis paper. By applying Chi Square analysis it can be seen in table 21 that no significant difference occurs within any test question. As previously stated, questions from the demographic and current use sections of the survey were not statistically analyzed because they pertain to survey participant specific information. The information presented in statements 7 through 15 were non-specific in nature.

Number of Question	Chi Square Value
Seven	5.715
Eight	3.839
Nine	3.117
Ten	5.119
Eleven	5.884
Twelve	5.133
Thirteen	0.319
Fourteen	2.381
Fifteen	0.457

N = 20

Figure 1. Statistical Results of Chi Square Analysis

APPENDIX E:

EMERGENCY SIMULATION TRAINING RULE BOOK

APPENDIX E: EMERGENCY RESPONSE SIMULATION RULE BOOK

RULE BOOK

The Rule Book is designed to provide staff and line supervisors with a stand-alone document that will serve as both an instruction manual and gaming play book in support of the Emergency Response Simulation Exercise. This Rule Book can easily be sent via mail or interoffice dispatch to any anticipated participating agency. It is suggested that a copy of the Rule Book be provided to all simulation training participants at least one week prior to the exercise.

The Emergency Simulation Center (ESC) can be set up in almost any area in which a conference table could conceivably be placed. A conference table will be utilized to support the training map and simulation exercise gaming pieces. A large paper map approximately three by five (3x5) feet in size depicting the entire airport property and surrounding area will be attached to the table and used to coordinate emergency planning. In addition to the map gaming pieces will be used to simulate the position of personnel, equipment, and vehicles on the field. Hazard areas and obstacles such as marsh, ditches, and aircraft wreckage will be outlined on the map to provide for realism in movement of the gaming pieces.

CONTENTS

Several Tables of Events (TOE) will be compiled and held separately from the Rule Book by the Evaluation Team. Each TOE will be designated to represent a specific participating agency. For example, the Fire Department will be represented by TOE number one (1). Each TOE will be comprised of twelve (12) separate event gaming cards describing a situation that must be acted upon. These gaming cards will be issued to participants one at a time throughout the game as each player takes their turn. Each event gaming card will state a specific situation followed by one (1) to five (5) separate emergency events. The participant of that agency will then be required to take action by selecting the highest-priority event listed. An example fire department situation would be "a secondary fire in close proximity to the accident sight requires 1000 gallons of water with Aqueous Film Forming Foam (AFFF) and three Rescue and Fire Fighting Personnel (RFF)."

Each event will be assigned a priority from one (1) to five (5) points--with the lowest point going to the highest-priority event. In the situation listed above (secondary fire), an example would be "put the fire out = one (1) point, remove survivors = two (2) points, or protect the accident site = three (3) points." At no time will the Evaluator disclose the priority level of any event in the table. It will be the responsibility of the agency participant to determine the highest-priority of each event.

The points system will be used to determine the viability of responses and decisions made by each agency representative. In addition to points assigned to low and high-priority events as described in the Events paragraph above, penalty points will also be assigned by the Evaluation Team in accordance with this Rule Book. At the end of simulation training the effectiveness of each agency will be determined by the lowest number of points accumulated during the exercise.

GENERAL

1. The simulation exercise Judge will be the controlling authority throughout the gaming period which will last for a duration of exactly two hours. During this time the Judge will exercise authority over the Evaluation Team and all simulation exercise participants.

2. After notification of an aircraft mishap by the ATCT the telephonic alert of all necessary airport personnel will be the next action to take place in the simulation exercise. Response effectiveness will be determined by completing an actual alert initiated by the Comm Center and timed to determine the call-back reply from each member. Additional time will be added to each respondent's reply time to simulate an approximate arrival time for that individual. An actual alert and physical response to duty is recommended at least once every six (6) months for all airport personnel.

3. In the event that any participant is approached by a member of the news media and questioned, the correct response will be to direct that person to the Command Post and subsequently to the Public Information Officer. A penalty of two (2) points will be assessed for any non-authorized comments made to the media.

4. Score sheets will be tallied up at the end of the simulation exercise to determine the maximum points assessed to each agency participant--lowest score wins.

5. Any decision made by one agency participant which affects the operation of another agency will provide an opportunity for the affected agency participant to respond out of turn. Any affected agency participant who does not respond to the above event will be assessed a two (2) point penalty.

6. Each evaluator will be completely familiar with the Airport Emergency Plan and the capabilities of all participating agencies. No participant will be allowed to complete an action which directly violates the Emergency Plan or the agency's capabilities.

7. All participants will be responsible for completing action by means of their own
decisions. Any participant receiving help in the way of advice from other participants will be assessed a two (2) point penalty.

8. All communications between participants will be completed by utilizing regulation communication terminology to increase realism.

9. In cases where an agency participant might not be available for training the Evaluation Team will provide guidance on the expected responses and capabilities of that agency.

10. Establishment of a temporary morgue during simulation exercise will not require the county coroner to be there.

ACTION

11. Inability of a participant to complete an assigned action within three (3) minutes of receiving an event game card will result in a penalty of six (6) points being assessed to that participant's agency. Any action taken by a participant will be final until the following turn at game for that participant.

12. Evaluators will announce periodic updates on the original scenario which will affect the situation for all participants. These events will be announced without warning and are designed to simulate the natural unfolding of information during a crisis.

13. Each score sheet must show the number of personnel needed, fuel expended, AFFF agent expended, and vehicles used. These items will be depleted as the game progresses. Other agencies may loan equipment and personnel to needy agencies, however, this will incur a penalty of three (3) points against the loaning agency for each item loaned out. The loaning agency will lose control over any assets it loans out to another agency.

14. Any agency wishing to utilize school busses from the county school bus system will incur a time delay of ten (10) minutes for the following reason: Primary driver not available for duty. Any additional busses requested by an agency will receive a five minute time delay for each.

TIMING

15. The Evaluation Team will be responsible for keeping the official "Time Clock." No other time piece or alarm will be used to maintain time delay or playing times during the simulation.

16. Each agency participant will receive an initial issue of ten (10) personnel gaming pieces. These pieces will be utilized as needed and will be augmented by replacements of five (5) new pieces after five (5) minutes from start of game. Ten (10) additional personnel pieces will be issued to each participant after twenty minutes from start of game. A final issue of ten (10) personnel gaming pieces will be given to each participant after forty-five (45) minutes from start of game. Additional replacements will be available by request at any time during game play, however, these requested personnel pieces will result in a penalty of three (3) points being assessed prior to one hour after start of game and one (1) point penalty after one hour from start of game.

17. Each airport division will be restricted to the normal duty personnel level for that division. The additional augmentation of airport personnel will be dictated by the airport telephone alert response result.

18. Response times for the simulation exercise will be determined based on each gaming scenario. Response times will also be listed in the situation described on gaming cards.

19. All time delays will be listed in the scenario or determined as needed by the evaluation team. In the event that a conflict arises with relation to time delays the Judge's decision will be final.

SAFETY

20. If any unsafe or unreasonable practice is observed, the exercise will be halted by the evaluators and corrective action will be taken to prevent negative reinforcement of such practices.

21. Observers will be limited to a select group of individuals with a need to see the simulation exercise in order to prevent distracting the participants.

22. Any survivor game piece left in a water hazard area for more than four minutes will be declared deceased and transported to the morgue. A penalty of six (6) points will be assessed to the agency responsible for rescue.

23. Any survivor game piece that does not receive initial care and first-aid within ten (10) minutes will be declared deceased and transported to the morgue. A penalty of six (6) points will be assessed to the agency responsible for rescue.

24. Each TOE will depict a severity of injury and recommended time to be treated by. Any survivor game piece which is not treated within that time period will be declared deceased and a penalty of six (6) points assessed.

MOVEMENT

25. Emergency response vehicles in route to or from dispatch points will be placed in the in-route box and will not be used prior to the appropriated time delay pause as determined by the Evaluation Team. Emergency vehicles are defined as helicopters, fire trucks, ambulance, police vehicles, mobile command post or any private and commercial equipment used for the purpose of emergency response.

26. Upon completion of simulation, Airport Operations division will be responsible for the removal of any aircraft wreckage from active runways, taxiways, and vital access roads. Removal of wreckage must be in accordance with federal and local regulation.

27. All emergency response vehicles will be moved around the gaming board by means of established roads or access paths. No vehicle will be allowed to arbitrarily by-pass a marked obstacle such as a lake, marsh, crash site, or impassible ditch. Applicable delay times will be assigned by the Evaluation Team--or described by the Rule Book--for each vehicle movement.

DEBRIEFING

28. A video recording will be made of the center gaming board during the simulation exercise for the purpose of evaluation and debriefing. Upon completion of the simulation exercise all participants will complete a debriefing survey.

GAMING PIECES

Gaming pieces will be color-coordinated and distinguished by size and shape. All personnel gaming pieces will be one by one (1"x1") inch square, and vehicles will be represented by one by four (1"x4") inch rectangles. In addition, the gaming pieces will be made from colored construction paper. Use of paper will facilitate flexibility in gaming and prevent the loss of pieces from becoming a hinderance to simulation. Each piece can be duplicated easily and inexpensively. In addition, pieces can be identified by magic marker to represent different agencies and discarded when no longer needed. The example in figure 2 can be used to provide an idea of gaming pieces, numbers, and identification markings:

Agency	Personnel	Vehicles	Color	Marking
EVAC	35	20	Red	EVAC
City Fire	35	15	Yellow	CF
Airport Fire	12	5	Yellow	AF
Operations	11	9	Green	AO
City Police	35	15	Blue	CP
Airport Police	8	2	Blue	AP
State Police	8	4	Black	SP
Survivors	200	0	White	SURV
Bulldozers	2	2	Orange	DOZ
EMS Helicopter	0	5	Red	H
School Buses	0	20	Pink	BUS
Crane	0	1	Orange	CRN
Tow Trucks	0	3	Orange	TOW

Figure 2. Identification of simulation training personnel and equipment

EQUIPMENT

The following rescue equipment will be simulated and made available to any agency participant who cannot prove it exists in that agency's inventory:

Medical and First Aid kits

Rope or tape to seal off areas

Wooden stakes or folding barricades

Folding cots

Blankets

Body bags

Identification tags and marking pens